National Health and Nutrition Examination Survey 2003-2004

Documentation, Codebook, and Frequencies

MEC Laboratory Component: Plasma Glucose, Serum C-peptide, and Serum Insulin

Survey Years:
2003 to 2004

SAS Export File:
L10am_C.XPT

January 2006

NHANES 2003–2004 Data Documentation

Laboratory Assessment: Lab 10AM - Glucose, Insulin, and C-Peptide

Years of Coverage: 2003–2004 **First Published:** January 2006 **Last Revised:** N/A

Component Description

Diabetes mellitus was assessed by measures of plasma glucose, serum insulin, and serum c-peptide in participants aged 12 years and over in the morning examination (AM) session only. Glycohemoglobin measures were available for a full sample.

Diabetes is a leading cause of disease and death in the United States. Eight million Americans are known to have diabetes, and an equal number have undiagnosed diabetes. In 1993, nearly 18 percent of all deaths for persons over the age of 25 were among people with diabetes. The prevalence of diabetes and overweight (one of the major risk factors for diabetes) continue to increase. Substantial new efforts to prevent or control diabetes have begun, including the Diabetes Prevention Trial and the National Diabetes Education Program.

Information on the prevalence of diabetes disease, especially in its early stages, and associated risk factors will be used to help develop early intervention and prevention programs for the disabling consequences of this condition. Specifically, the diabetes disease examination will provide population data to: 1) determine a national estimate of diabetes disease prevalence (diagnosed and undiagnosed), including those at high risk for the late complications of the disease (i.e., ulceration and amputation); 2) identify the risk factors of diabetes disease; 3) permit a national cohort to be established for follow-up studies of this condition; and 4) provide critical information to clinicians and public health officials for the development of preventive care and community-based interventions.

Eligible Sample

Participants aged 12 years and older who were examined in the morning session were tested.

Description of Laboratory Methodology

Glucose

The enzyme hexokinase (HK) catalyzes the reaction between glucose and adenosine triphosphate (ATP) to form glucose-6-phosphate (G-6-P) and adenosine diphosphate (ADP). In the presence of nicotinamide adenine dinucleotide (NAD), G-6-P is oxidized by the enzyme glucose-

6-phosphate dehydrogenase (G-6-PD) to 6-phosphogluconate and reduced nicotinamide adenine dinucleotide (NADH). The increase in NADH concentration is directly proportional to the glucose concentration and can be measured spectrophotometrically at 340 nm.

Insulin

Insulin radioimmunoassay (RIA) is a double-antibody batch method. Insulin in the specimen competes with a fixed amount of ^{125}I-labelled insulin for the binding sites of the specific insulin antibodies. Bound and free insulin are separated by adding a second antibody, centrifuging, and decanting. The radioactivity in the pellet is then measured. The radioactivity is inversely proportional to the quantity of insulin in the specimen.

C-Peptide

C-peptide radioimmunoassay (RIA) is a competitive assay where ^{125}I-labeled C-peptide competes with C-peptide in the specimen for antibody sites. Bound and free C-peptide is separated by adding a second PEG-accelerated double antibody. The antibody-bound fraction is precipitated and counted. The radioactivity is inversely proportional to the quantity of insulin in the specimen.

There were no changes to the equipment, lab method, or lab site from the previous 2 years.

Laboratory Quality Control and Monitoring

The NHANES quality assurance and quality control (QA/QC) protocols meet the 1988 Clinical Laboratory Improvement Act mandates. Detailed QA/QC instructions are discussed in the NHANES Laboratory/Medical Technologists Procedures Manual (LPM). Read the LABDOC file for detailed QA/QC protocols.

A detailed description of the quality assurance and quality control procedures can be found on the NHANES website.

Data Processing and Editing

Blood specimens were processed, stored and shipped to University of Missouri-Columbia, Columbia, MS for analysis. Detailed specimen collection and processing instructions are discussed in the NHANES LPM. Read the LABDOC file for detailed data processing and editing protocols. The analytical methods are described in the **Description of the Laboratory Methodology** section.

There were no top coding or derived variables in this file. See the lab10am Freqs link to determine “below detectable limit fill values” for

this data.

Detailed instructions on specimen collection and processing can be found on the NHANES website.

Analytic Notes

The analysis of NHANES 2003–2004 laboratory data must be conducted with the key survey design and basic demographic variables. The NHANES 2003–2004 Household Questionnaire Data Files contain demographic data, health indicators, and other related information collected during household interviews. They also contain all survey design variables for these age groups. The phlebotomy file includes auxiliary information such as the conditions precluding venipuncture. The household questionnaire and phlebotomy files may be linked to the laboratory data file using the unique survey participant identifier SEQN.

LBXGLU and LBXGLUSI: Plasma glucose

LBXCP and LBXCPSI: C-peptide

LBXIN and LBXINSI: Insulin

Plasma glucose, serum c-peptide, and insulin were measured by the Diabetes Diagnostic Laboratory at the University of Missouri-Columbia on participants aged 12 years and older in the morning examination session only.

The Laboratory 10 Data File (which contains laboratory test results for glucose - LBXGLU) was measured using the reference analytic method. However, the lab 40 biochemistry profiles also included measurements of this analyte. The serum glucose values (LBXSGL) reported in this release should not be used to determine undiagnosed diabetes or prediabetes. Instead, plasma glucose values (LBXGLU) should be used based on the reference analytic method of this analyte.

Sampling Weights

The analyst is strongly encouraged to use the special sampling weights in this file to analyze 2003–2004 glucose, insulin, and c-peptide.

References

None

Locator Fields

Title: Glucose, Insulin, and C-Peptide

Contact Number: 1-866-441-NCHS

Years of Content: 2003–2004

First Published: January 2006

Revised: N/A

Access Constraints: None

Use Constraints: Use special weights in the file for your analysis.

Geographic Coverage: National

Subject: Glucose, Insulin, and C-peptide

Record Source: NHANES 2003–2004

Survey Methodology: NHANES 2003–2004 is a stratified multistage probability sample of the civilian non-institutionalized population of the U.S.

Medium: NHANES Web site; SAS transport files

National Health and Nutrition Examination Survey
Codebook for Data Production (2003-2004)

Plasma Glucose, Serum C-peptide and Serum Insulin (L10AM_C)

Person Level Data

January 2006

SEQN	Target
	B(12 Yrs. to 150 Yrs.)
Hard Edits	**SAS Label**
	Respondent sequence number
English Text: Respondent sequence number.	
English Instructions:	

WTSFA2YR	Target
	B(12 Yrs. to 150 Yrs.)
Hard Edits	**SAS Label**
	Fasting Subsample 2 Year Mec Weight

English Text: Fasting Subsample 2 Year Mec Weight

English Instructions:

Code or Value	Description	Count	Skip to Item
0 to 355659.48	Range of Values	3356	
.	Missing	0	

LBXGLU	Target
	B(12 Yrs. to 150 Yrs.)
Hard Edits	**SAS Label**
	Glucose, plasma (mg/dL)

English Text: Glucose, plasma (mg/dL)

English Instructions:

Code or Value	Description	Count	Skip to Item
45.7 to 547.6	Range of Values	3169	
.	Missing	187	

LBDGLUSI	Target
	B(12 Yrs. to 150 Yrs.)
Hard Edits	**SAS Label**
	Plasma glucose: SI(mmol/L)

English Text: Plasma glucose: SI(mmol/L)

English Instructions:

Code or Value	Description	Count	Skip to Item
2.537 to 30.397	Range of Values	3169	
.	Missing	187	

LBXCPSI	Target
	B(12 Yrs. to 150 Yrs.)
Hard Edits	**SAS Label**
	C-peptide: SI(nmol/L)

English Text: C-peptide (nmol/L) in SI units

English Instructions:

Code or Value	Description	Count	Skip to Item
0.021 to 5.112	Range of Values	3135	
.	Missing	221	

LBXIN	Target
	B(12 Yrs. to 150 Yrs.)
Hard Edits	**SAS Label**
	Insulin (uU/mL)

English Text: Insulin (uU/mL)

English Instructions:

Code or Value	Description	Count	Skip to Item
0.71 to 205.69	Range of Values	3134	
.	Missing	222	

LBDINSI	Target
	B(12 Yrs. to 150 Yrs.)
Hard Edits	**SAS Label**
	Insulin: SI(pmol/L)

English Text: Insulin: SI(pmol/L)

English Instructions:

Code or Value	Description	Count	Skip to Item
4.26 to 1234.14	Range of Values	3134	
.	Missing	222	